CORRELATIONS AMONG GENDER, CAREER INTERESTS, CONSERVATION ISSUES, AND CURRICULUM CHOICE BY STUDENTS IN WILDLIFE AND FISHERIES SCIENCES AT TEXAS A&M UNIVERSITY FROM 2000 TO 2008

A Thesis

by

ASHLEY NICOLE WOLDHAGEN

Submitted to the Office of Graduate Studies of
Texas A&M University
in partial fulfillment of the requirements for the degree of

MASTER OF SCIENCE

August 2009

Major Subject: Wildlife and Fisheries Sciences

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Approved by:

Chair of Committee,	Frances Gelwick
Committee Members,	Selma Glasscock
	Tim Murphy
Head of Department,	Thomas Lacher

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ABSTRACT

Correlations among Gender, Career Interests, Conservation Issues,
and Curriculum Choice by Students in Wildlife and Fisheries Sciences
at Texas A&M University from 2000 to 2008. (August 2009)
Ashley Nicole Woldhagen, B.S., Texas A&M University
Chair of Advisory Committee: Dr. Frances Gelwick

It is important to develop and assess student learning outcomes in order to determine whether academic department goals and standards are being reached. One aspect of this process involves alignment of learning outcomes with stakeholder criteria (expectations, beliefs) for assessment. The Department of Wildlife and Fisheries Sciences at Texas A&M University has not previously developed a program assessment of student learning outcomes. However, a survey has been administered to undergraduate students enrolled in a mandatory class, Conservation and Management (WFSC 201). Among other questions, the survey asked students to provide information about their curriculum choice, agreement with value statements about wildlife and conservation issues, career interests, graduate school plans, and importance of issues related to wildlife and fisheries management and conservation. To evaluate alignment of student choice of curriculum with expectations and beliefs related to their choice of career, I tested the student responses to curriculum choice for relationships to responses to survey questions about career interests, gender, and graduate school plans for surveys

administered in 2000 and 2008. For these same surveys, I also tested responses to value statements for relationships to responses for importance of issues, in addition to career interests, gender, and graduate school plans.

Similar percentages (24%) of the total variation in curriculum choice and in agreement with value statements were explained: Career interests explained 18% of the variation related to curriculum choice and 8% of variation related to value statements. Year and gender combined explained only 2% of the variation in either dependent variable. Responses to important issues explained 11% of the variation in responses to value statements.

Choice of curriculum was most strongly related to career interests and graduate school plans. Students who chose the teaching curriculum option were interested in careers in public school education and planned on attending graduate school. Students who chose curriculum options in aquaculture and fish ecology and management were interested in careers in aquaculture and as government fisheries biologists and conservation officers and planned on attending graduate school. Students who chose the curriculum options in wildlife ecology and management and other options were interested in a broad range of careers and were undecided about graduate school.

Although importance of issues and career interests explained 19% of the variation in student agreement with value statements, this relationship was not statistically significant. Issues of greatest importance to females were endangered species, habitat destruction, water availability, loss of biodiversity, and water pollution. Females in 2000 tended to choose careers in public school education and as government

wildlife biologists, and in 2008 chose careers in nature center education and as urban wildlife biologists. Issues of greatest importance to males were landowner rights to resources, such as high fences to enclose wildlife, access to rivers, water availability, and hunting of wildlife. Males in 2000 tended to choose careers as conservation officers, and in 2008 chose careers in ranch management, private consulting, and as government fish biologists and urban wildlife biologists.

This data provides the Wildlife and Fisheries Department at Texas A&M University with information about its students and how they responded to curriculum options, career interests, value statements, and important issues.

DEDICATION

To my mom and dad who have always been there to support, encourage, and love me.

ACKNOWLEDGMENTS

I would like to thank my committee chair, Dr. Frances Gelwick, and my committee members, Selma Glasscock and Dr. Tim Murphy, for their guidance, support, and invaluable feedback throughout the course of this research.

Thanks also to my friends and colleagues and the department faculty and staff for making my time at Texas A&M University a great experience. I would like to thank Dr. Grant and Dr. Todd Swannack for all of their support and encouragement. I also want to thank Dr. R. D. Slack and his graduate students, who provided the survey instrument.

I would like to thank Krystal Windham for providing the data I used in my research and for her friendship and support over the years.

Finally, I would like to thank my mom, dad, and family for their love, encouragement, and support over the years. I would also like to thank my boyfriend James for his love and encouragement.

NOMENCLATURE

CANOCO	CANOnical Community Ordination
Ca	Career
CCA	Canonical Correspondence Analysis
Cu	Curriculum
Partial CCA	Partial Canonical Correspondence
NA	Not Available
WFSC	Wildlife and Fisheries Sciences

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1. INTRODUCTION

Program assessment is an important aspect of higher education, and assessment of student learning outcomes for a program can help to determine whether or not academic department goals and standards are being reached. It is important to observe not only the progress of individual students but also to observe the progress of the program as a whole in the context of viewpoints from various stakeholders, including students themselves as well as their perspective employers. This is a current aspect of assessment in the Department of Wildlife and Fisheries Sciences at Texas A&M University. An assessment plan could help the department determine whether or not students are gaining the appropriate knowledge and skills required to further their education and achieve career success in their chosen field. The Department of Wildlife and Fisheries Sciences at Texas A&M University offers its undergraduate and graduate students coursework in the conservation and management of natural resources. The Department Mission Statement indicates that students will develop skills through hands on experience, research and extension opportunities, and writing intensive coursework. The degree options available to undergraduate students pursuing a Bachelor of Science Degree in the Department of Wildlife and Fisheries, are Aquatic Ecology and Conservation, Wildlife Ecology and Conservation and, Vertebrate Zoology. The faculty

This thesis follows the style of NACTA Journal.

is dedicated to enhancing student learning about animal ecology, systems ecology, biodiversity, and management of wildlife and fisheries resources, among other topics.

A part of the departmental mission statement is to preserve natural ecosystems and the environment while taking the appropriate actions to account for human welfare (Wildlife & Fisheries Homepage). As part of the departmental program assessment, students working towards degrees in the Wildlife and Fisheries Department could be asked to provide information about themselves that would help align program outcomes with student learning outcomes. Student surveys can be used to gather findings as to whether or not departmental learning outcomes are being met, and to develop appropriate responses based on these findings.

1.1 What is assessment?

Assessment plans can be an effective way to measure student learning and have been used for many years. "Assessment is a systematic process of gathering and interpreting information to discover if a program is meeting established objectives and then of using that information to enhance the program (Virginia Common Wealth University 2002)." A good assessment examines students' comprehension and skills which are important aspects of targeted learning (Brown and Glasner 1999). Assessment involves students, faculty, and administrators at multiple levels of organization, which includes the progress of students following a specific degree plan in an academic department. Program outcomes assessment can be used to determine whether or not a program is meeting the learning needs of students that choose to enter the departmental

degree program (Virginia Common Wealth University 2002). For example, assessment provides feedback in the form of findings about learning outcomes that can be used to help improve a program and provides evidence about what is occurring in or being accomplished by a program (Virginia Common Wealth University). Thus, assessment documents steps that a program is taking to evaluate and analyze the effectiveness of its teaching and student learning outcomes, and guides educational and institutional improvement (University of Northern Iowa).

1.2 Types of assessment

There are different approaches to assessment. One main difference that should be considered is that between program outcomes assessment and classroom assessment. "Program outcomes assessment is periodically conducted by administrators to make changes that benefit future students and classes, whereas classroom assessment is continuously conducted by faculty to make immediate changes that benefit their current students (Daigle, Hayes et al. 2007)." Both forms of assessment are. Individual instructors can measure and assess whether or not classroom objectives are being reached for their specific course, and provide valuable feedback to not only the instructor, but also to individual students to help them improve their own learning. In contrast, program outcomes assessment is used to track achievement of student learning outcomes aggregated at the level of the department and intended to provide feedback to faculty, advisors and administrators. There are also direct and indirect approaches to assessment of student learning. Indirect approaches measure the value and extent of

learning (Martell and Calderon 2005). Alternatively, knowledge surveys are examples of direct assessment, which can cover topics of an entire course in order to review student knowledge of content. Student mastery of knowledge within topics is best measured by such direct methods (Price and Randall, 2008). Generally, surveys are given at the beginning (pre-) and the end (post-) of an intervention (single course or series of courses in a curriculum) to evaluate success of that intervention regarding the particular outcomes being measured.

1.3 Faculty motivation

Individual faculty members expect that adequate levels of foundational learning have been achieved as preparation for learning in their particular classes. For an assessment of program learning outcomes to be successful, faculty involvement in the department is essential (Banta, Lund et al. 1996). Collaborative efforts and discussions among faculty and administrators will lead to departmental goals and objectives that reflect the interests of all stakeholders, including future students and their employers. Therefore, a key to successful program assessment is to motivate faculty. The problem is not in motivation of faculty to assess individual student progress and make changes for improvement, rather it is the need for faculty to appreciate and develop a combined assessment across students and courses (Banta, Lund et al. 1996). The department faculty and administrators need to plan what to assess in order to use that data to make improvements to the program. Information from assessment data needs to be applied with the intention to make improvements at the level of interest (Banta, Lund et al.

1996). It is the students' responsibility to meet the learning outcomes of the department and the individual classroom level, and the instructors' responsibility to identify the outcomes, set the assessment criteria, and monitor student performance toward achieving those outcomes (Daigle, Hayes et al. 2007).

Views of both students and faculty play important roles in the dynamics of the assessment process. For example, student perceptions about the purpose of an assessment can influence their responses on a tool for assessment, such as an opinion survey, as well as on a summative assessment such as an examination (Watering, Gijbels et al. 2008). It is important that faculty consider this, and clarify the purpose in order to facilitate the goals of the assessment. For example, in responding to an opinion or information survey, students need to understand the importance of their responses, and thus answer truthfully instead of what they think the desired or 'correct' answer might be. A transformational view of assessment (Watering, Gijbels et al. 2008) is 'assessment as a tool for learning' (Dochy and McDowell 1997). Thus, the assessment experience itself can shape the learning of students, faculty, and administration.

1.4 Making a good assessment

A key to a successful assessment is the design itself. It is important to have multiple opinions from students, faculty, and administrators. In order to create a successful program assessment the department needs to establish a mission statement, commit to promoting student learning assessing if learning outcomes are being achieved, and making improvements based on assessment findings that enhance student learning

(Lowry, Howery et al. 2005). Student learning outcomes should reflect the attainment of intended knowledge and skills. The American Association for Higher Education (AAHE) has provided nine principles of good practice for assessing student learning (Appendix A) (Astin, Banta et al. 2006). Assessments can improve how courses are taught, provide information about what students have learned and their ability to use what they have learned through assessment of student performance. Assessments can provide data to compare student performance against both internal (departmental or academic), as well as public, professional or institutional criteria and standards. Distributing assessment events over a period of time will provide more insight on progression and maintenance of learning, as well as how long it may take to reach educational goals. Using the identical survey instrument repeatedly, allows for responses to be comparably tracked over a period of time (Astin, Banta et al. 1996). For a successful assessment of student learning, participation from sources other than students and faculty can be beneficial. Involving individuals, like employers from beyond the campus, in assessment planning can enhance the standards and goals for learning (Astin, Banta et al (1996). Multiple parties share the responsibility to improve student learning outcomes in wildlife education (Lopez 2001). Employers and alumni can provide insight, based on their experience, as to what is important to monitor in order to assess progress toward specific student learning outcomes that will benefit students out in the workforce. The curriculum should emphasize and meet students future needs (Brown and Nielsen 2000). Students need to be able to incorporate the knowledge and skills learned from their studies into their future jobs. For example, students should be able to

compare and contrast different views and challenge new ideas, to think critically and direct their own continued learning (Matter and Steidl 2000). Critical thinking is an invaluable skill that will benefit students, as well as society, by allowing them to adapt and develop new technologies to address the needs within a constantly changing environment. Are educational institutions providing such training? Answering such questions and acting on the findings should be included in program assessment plans.

1.5 Assessment in the Wildlife and Fisheries department

The Department of Wildlife and Fisheries Sciences at Texas A&M University had not previously developed a formalized program assessment of student learning outcomes. However, Dr. R. D. Slack and his graduate students have been administering a survey to undergraduate students enrolled in a mandatory class, Conservation and Management (WFSC 201). The survey asks students to provide information about their background (e.g., population size of their home town), recreational and other interests, knowledge about facts, and opinions about issues related to wildlife and fisheries management and conservation. Some of these questions provide information that can be used to understand how students' career interests are related to their choice of curriculum and degree options, as well as their beliefs and values regarding issues in wildlife, fisheries and conservation.

A survey could be constructed to gather information not only about individual students, but also about various outcomes set for each degree program in the Wildlife and Fisheries Sciences Department at Texas A&M University. This assessment

instrument would allow the departmental faculty and advisors to monitor strengths and weaknesses within the program and use findings to make improvements. For example, the survey could provide information to not only help instructors to better focus their class objectives to meet the department's student learning outcomes, but provide an instrument through which the faculty coordinate actions to adapt the sequence of delivery as well as course content of the curricula.

My study examines the responses by Dr. Slack's students to selected survey questions related to their choice career interests and choice of curriculum options, and the internal consistency of student responses to two related questions, one about importance to students of particular conservation issues and the other about specific beliefs students might have regarding these issues. I also will compare the responses of the students in different years to evaluate the temporal variation in these responses and their relationships to one another, as well as the potential for these questions to be used to assess particular student learning outcomes for the undergraduate degree program in the Wildlife and Fisheries Sciences Department at Texas A&M University.

My first objective tested for patterns in student responses to two questions on the survey (1) "I am interested in the following curriculum options or areas of concentration (Survey Question 3 in 2000 and 2008)" and (2) "At this time which of the following careers are you most interested in (Survey Question 14 in 2000; Question 15 in 2008)?", and patterns in the relationships of these responses to those for other selected survey questions that provide background information about the student. In particular, I hypothesized that response patterns would also be related to gender (Survey Question 1)

and plans to continue their education as indicated by responses to the survey question "After finishing your B.S. degree do you plan to attend: graduate school, health related professional school, or professional (law) school (Survey Question 13 in 2000; Question 14 in 2008)?".

My second objective was to test for consistency in patterns among student responses to two question sets, (1) "How important are the following issues to you" (Survey Question 11 in 2000; Question12 in 2008), and (2) "Do you agree or disagree with the following statements?" (Survey Question 18 in 2000; Question 20 in 2008), as well as relationships of these patterns to responses to the background survey questions. For example, I hypothesized that gender, plans to continue their education, and career interest would influence patterns in these responses.

In addition, I tested to determine if patterns in these responses also are related to the year class of students who answered the survey questions. Responses for gender, curriculum, and plans to continue their education after graduation should provide information useful in guiding decisions about adapting the curriculum content to the career needs and interests of WFSC students. Moreover, by repeating the same survey questions in a survey of graduating seniors, analysis of responses could provide findings to indicate the influence of the WFSC degree program on student career and curriculum.

2. METHODS

2.1 Student subjects, survey questions, and analyses

The survey comprises several questions, but I only used selected questions to analyze in my study. I am using the categorical data (0/1) for each response variable on the survey instrument, which was previously entered by another graduate student (Krystal Windham) into a spreadsheet. Over the years some questions were not included or the answers were modified over time. Therefore, some data is missing and student responses to similar questions were stated in slightly different ways. In addition, some student responses to some questions were either left blank or multiple responses were given even though a single response was requested. Where responses or data were missing, NA (not available) was entered into the spreadsheet, and the student response for that observation was omitted. Because optional responses to some questions differed among years, I recoded responses to those questions when possible, so that I could include those data in the analysis. In preliminary analyses, I ran one analysis with and one without these re-coded datasets to test the influence of these missing data on results for my primary objectives, and I detected that there was a significant effect of these missing values. Therefore, I only included datasets from the surveys administered in 2000 and 2008. There were 154 usable student surveys; 59 for 2000 and 95 for 2008. I analyzed the student responses using the CANOCO (CANOnical Community Ordination) software program (ter Braak and Smilauer, 2002) for analysis of multivariate data. I tested for multivariate correlations among student responses treated as dependent variables and explanatory (independent) variables, based on reciprocal

(weighted) averaging (Gauch 1982) and multiple correlation (ter Braak 1986). I used backward elimination to determine which variables stayed in the final model. I eliminated explanatory variables that had variance inflation factor (VIF) values > 5.0 to avoid inflation of significance tests due to multicollinearity among independent variables. Monte Carlo randomization tests were used to calculate F-ratios and significance tests for correlations of the canonical (explanatory) axes with dependent variables. In addition, I used the calculated t-values of the regression coefficients of explanatory variables to interpret the strength of their influence on the ordination axes of the final model; significant t-values are those $\geq$ |2.1|.

Partial Canonical Correspondence Analysis (Partial CCA) was used to quantify the variation due to separate groups of explanatory variables. This is a process of variance decomposition that calculates the amount of unique and shared variation among the explanatory variables. The F-ratios of the explained versus total variance were tested and those having P-values ≤ 0.05 were considered significant. To display these relationships, I created joint plots using the Canodraw software (Version 4.0) included in CANOCO version 4.5 (ter Braak and Smilauer, 2002) to visualize the relationships among response variables and explanatory variables on the same axes.

Table 1: Labels for curriculum options (response variables, black triangles▲) plotted for the ordination analysis. (Figures 1 and 2).

Abbreviation	Curriculum Option
CuAqcul	aquaculture
CuFshEM	fisheries ecology and management
CuConBio	conservation biology
CuTxMuSc	taxonomy/natural resource collections and museum Science
CuTeach	teaching
CuUrbWFM	urban wildlife and fisheries management
CuVZoo	vertebrate zoology
CuWldlEM	wildlife ecology and management
Cu NtRCon	natural resources conservation option
CuOther	other
CuUndec	undecided

Table 2: Labels for career interests (explanatory variables, blue open circle○) plotted for the ordination analysis. (Figures 1, 2, 4, and 6).

Abbreviation	Career Interest
CaGvFshB	government fisheries biologist
CaCnsOfc	conservation officer (game warden)
CaGvWldB	government wildlife biologist
CaPkIntp	park interpretation
CaRnchMn	ranch management (wildlife)
CaMusEdu	museum education
CaPvCnsl	private consulting
CaAqcul	aquaculture
CaConNGO	conservationist with a non-governmental organization
CaWQTec	water quality technician
CaUrbWFB	urban wildlife or fisheries biologist
CaNtCtEd	nature center education
CaPbscEd	public school teacher
CaOther	other
CaUndec	undecided

Table 3: Labels for other explanatory variables, year (red open circle), gender (yellow open circle), and graduate school plans (green open circle) plotted in the ordination analysis. (Figures 1, 2, 3, and 5).

Abbreviation	Other Explanatory Variables
Male	gender
Female	gender
AtGradSY	attend graduate school- yes
AtGradSN	attend graduate school- no
AtGradSU	attend graduate school- undecided
2000	year (non-seniors only)
2008	year (non-seniors only)

Table 4: Labels for value statements (response variables, A = agree, black triangle ▲, D = disagree, light blue down triangle ▼, N = no opinion, purple star ✦) plotted in the ordination analysis. (Figures 3 and 5).

Abbreviation	Value Statement
HntNec	Hunting is a necessary means of managing wildlife populations.
HntCrul	Hunting is cruel and should be illegal.
LdOwnWL	Wildlife on private land should belong to the landowner.
GvRgHnt	The state and/or federal government should regulate hunting, even on private land.
LdOwnWt	Water in ponds and lakes on private land should belong to the landowner.
LdOwnAq	Water in aquifers below private land should belong to the landowner, and he/she should be allowed to pump all the water he/she wants.
LdOwnSt	If a stream flows through a person's land, he/she should be allowed to use all that he/she wants.
HiFenOK	Owners of private land should be allowed to erect 10' fences to fence wildlife in or out.
ESGvPro	Endangered and/or threatened species should be protected by the federal government.
ESReimb	Land owners should be reimbursed for any costs or economic losses due to complying with the law protecting endangered species.
PplMnWL	People have the right to manage wildlife populations.
WLtoAll	Wildlife belong to all people, even if found on private land.
BredHnt	It is ok to breed and raise wildlife (deer, ducks, quail) to release for hunting.
GvRgOcn	The fish and shrimp in the ocean belong to everyone and the government has the right to regulate recreational and commercial harvest.
SantcGv	It is a good idea to have some wilderness or sanctuary areas for wildlife, protected by the government where no hunting or camping is allowed.
WLPet	Individuals should be allowed to have wild animals as pets.
FshCrul	Fishing is cruel and should be illegal.
AnRt=Pp	Animals have rights, just like people.

Table 5: Labels for important issues (explanatory variables; 0 = no importance, maroon open star, 1 = important issue, red open square, 2 = very important issue, green open diamond) plotted in the ordination analysis. (Figures 4 and 6).

Abbreviation	Important Issues
ESp	endangered species
LdOwnRt	landowner rights
WtrAv	water availability
OvHvMar	over-harvest of marine fishes
HbDstrx	habitat destruction
WtrPol	water pollution
HiFen	high fences
OvHntWL	over-hunting of wildlife
AccRvr	access to rivers
LosBioD	loss of biodiversity
InvSp	invasive species

2.2 Analytical design for correlations between dependent and explanatory variables

I considered student responses to curriculum options as the dependent variables in the first analysis (Table 1). The explanatory variables (independent variables) were year (2000 or 2008), gender (male or female), graduate school plans (yes, no, or undecided), and choice of career interest (Tables 2 and 3). In the second analysis, I considered student responses for agreement with listed value statements (Table 4) as the dependent variables. The explanatory variables for this analysis were choice of career interest, year (2000 or 2008), gender (male or female), graduate school plans (yes, no, or undecided), and level of importance of issues (Tables 2, 3, and 5).

3. RESULTS

3.1 Relationships between choice of curriculum and explanatory variables

The total inertia (9.346), quantifies the variation in the dependent variables among all student responses. The sum of all canonical eigenvalues (2.204) quantifies the variation in dependent variables that was explained by the combination of independent variables in the final model. Thus, 23.6% of the variation (2.204 divided by 9.346) in choice of curriculum was explained (Monte Carlo F-ratio: 2.468; P-value: 0.002). The first canonical axis explains 6.4% of the variation (Monte Carlo F-ratio: 9.264; P-value: 0.006). Axis 1 represents a gradient of students contrasting those who chose the curriculum in teaching, and were strongly interested in public school education as a career, and those who also had intentions of attending graduate school, versus students choosing other curriculum options and those undecided about graduate school (right to left in Fig. 1).

The second axis explains 5.4% of the variation. It represents a gradient of students contrasting those who chose curricula in aquaculture and fish ecology and management, and were strongly interested in careers in aquaculture, and as government fish biologists and conservation officers, and had intentions of attending graduate school, versus students who chose curricula in wildlife ecology and management, or were undecided about curriculum options, and were interested in a broad range of careers (top to bottom in Fig. 1).

The third axis explains 4% of the variation. It represents a gradient of students contrasting those, primarily males in 2000, who chose curricula in teaching, wildlife

ecology and management, natural resource conservation, and fisheries ecology and management, and were strongly interested in careers in public school education and ranch management and as government wildlife biologists, and were undecided about graduate school versus students, mostly females in 2008, who chose curricula in vertebrate zoology, conservation biology, urban wildlife and fisheries management, and taxonomy/ natural resource collections and museum science, and were interested in a career as a conservationist in a non-governmental organization, as well as other careers, and had made a decision about graduate school (right to left in Fig. 2).

The fourth axis explains 3.1% of the variation. It represents a gradient of students contrasting those who chose the curriculum in aquaculture, and were strongly interested in careers in aquaculture versus students who chose curricula in fisheries ecology and management and natural resource conservation, and were interested in a career as a government fisheries biologist (top to bottom in Fig. 2).

Partial Canonical Correspondence Analysis (Partial CCA) indicated that all variables combined to explain 23.58% of the variation in patterns of student responses to curriculum options and only 1.8% of their variation was shared among these variables. Choice of curriculum options depended significantly on career interest (18.02% of the variation), graduate school plans (2.14% of variation), and gender (1.62% of variation), but not year (0.88% of variation).

Table 6. Variance decomposition of the partial CCA representing variation (eigenvalue) and percent of total variation in (a.) students' choice of curriculum options (response variables; Table 1), and (b.) variation in student's agreement with value statements (response variables; Table 4) that were explained by the year they answered the survey, their gender, graduate school plans, career interests, and importance of issues (explanatory variables; Tables 2, 3 and 5). The shared variation is that equally explained by all variables in each analysis.

a. Curriculum choice

2000&2008		Eigenvalue	Percent		
Total Inertia		9.346	100.00%		p-value
	All Explanatory Variables	2.204	23.58%		
	Year	0.082		0.88%	**0.086**
	Gender	0.151		1.62%	**0.002**
	Graduate School Plans	0.2		2.14%	**0.012**
	Career Interests	1.684		18.02%	**0.002**
	Shared Variation			1.81%	

b. Agreement with value statements

2000&2008		Eigenvalue	Percent		
Total Inertia		0.481	100.00%		p-value
	All Explanatory Variables	1.988	24.20%		**0.034**
	Year	0.024		1.21%	**0.024**
	Gender	0.024		1.21%	**0.020**
	Graduate School Plans	0.026		1.31%	**0.370**
	Career Interests	0.151		7.60%	**0.766**
	Important Issues	0.211		10.61%	**0.298**
	Shared Variation			2.26%	

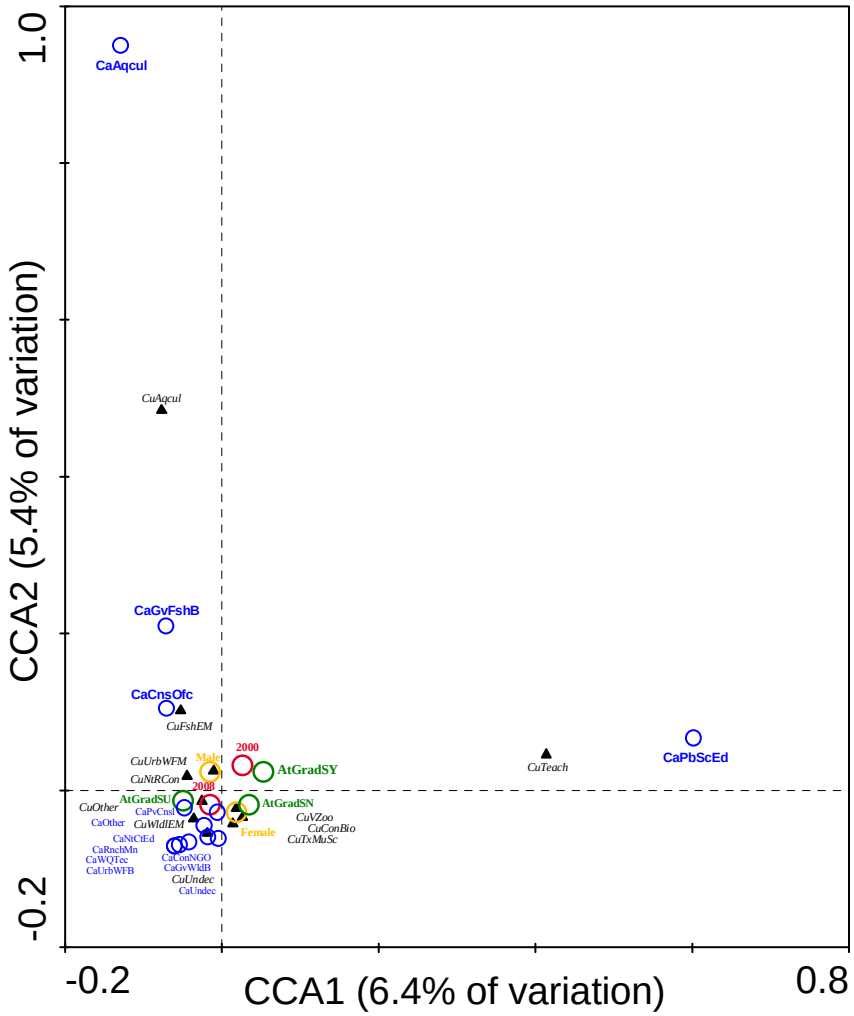

Fig. 1 Results for the first two axes of the canonical correspondence analysis, representing the explained variation in student responses to choice of curriculum options. Codes and symbols are in Tables 1, 2 and 3. Bolded labels for explanatory variables have significant t-values.

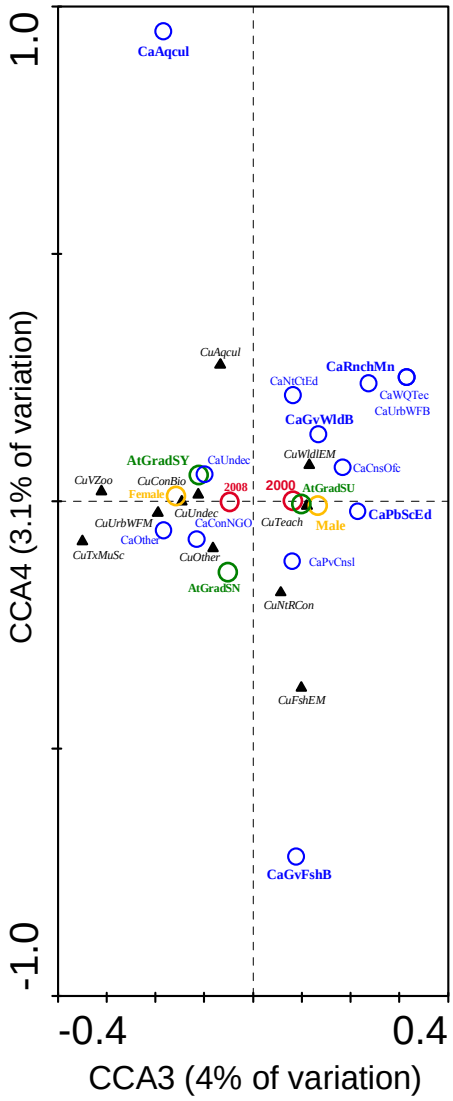

Fig. 2 The results on the third and fourth axes of the canonical correspondence analysis, representing the explained variation in student responses to choice of curriculum options. Codes and symbols are in Tables 1, 2 and 3. Bolded labels for explanatory variables have significant t-values.

3.2 Relationships between agreement with value statements and explanatory variables

I created four joint plots in Canodraw (Fig. 3, 4, 5, and 6) to depict the correlations among the response variables and the explanatory variables. For ease of visual interpretation, explanatory variables were separated into two groups. Both groups are plotted on the same axes, but represented in two figures for the first and second axes and in two figures for the third and fourth axes. The first group represents student responses to value statements (response variables; Table 4) and year, gender, and graduate school plans (explanatory variables; Table 3). The second group represents those same student responses to value statements and student responses to career interests and important issues (explanatory variables; Tables 2 and 5, respectively).

The total inertia (1.988), quantifies the variation in the dependent variables among all student responses. The sum of all canonical eigenvalues (0.481) quantifies the variation in dependent variables that was explained by the combination of independent variables in the final model. Thus, 24.2% of the variation (0.481 divided by 1.988) in students' agreement with value statements was explained (Monte Carlo F-ratio: 1.159; P-value: 0.034). The first canonical axis explains 5.6% of the variation (Monte Carlo F-ratio: 7.111; P-value: 0.036), and the second canonical axis explains an additional 3.0% of the variation.

The biplot represents the contrast between students (mostly females in 2000) who had no opinion about the value statements (bottom right quadrant of Fig. 3), and placed no or some importance on overharvest of marine fishes, and had career interests in nature center education, aquaculture, or undecided (bottom right quadrant of Fig. 4),

versus others (male and female) who either agreed or disagreed with the statements (all other quadrants of Fig. 3). Females in 2000, who also had plans to attend graduate school (upper right quadrant of Fig. 3), were more likely to agree that hunting and fishing are cruel, and that animals have rights like people; and to disagree that hunting is necessary, or that water and wildlife belong to the landowner, and to disagree that it is OK to have high fences or breed and release animals to be hunted, but disagreed with the statement that fish and shrimp in the ocean belong to everyone and government has the right to regulate recreational and commercial harvest. These students placed no importance on high fencing issues, but considered as very important issues of biodiversity loss, water pollution, habitat destruction and endangered species, and had career interests in public school education, as a government wildlife biologist, and working in a conservation NGO (upper right quadrant of Fig. 4).

These student responses contrasted with those for males in 2008 (lower left quadrant of Fig. 3) who were either undecided or did not plan to attend graduate school, who tended to hold the opposite opinions, and also agreed with statements that wildlife as well as water in streams and aquifers on private land should belong to the landowner, that people have the right to manage wildlife, and landowners should be reimbursed for losses due to complying with endangered species laws. These students gave no importance to endangered species issues and had career interests as water quality technicians, urban wildlife biologists, government fish biologists and private consultants, but gave some importance to water pollution, biodiversity loss and endangered species (lower left quadrant of Fig. 4).

The third axis explains 1.9% of the variation, and the fourth axis explains an additional 1.7% of the variation. The right side of axis 3 (Fig. 5) also represents primarily females, planning to attend graduate school, but responding in 2008, who like those in 2000, agreed that fishing and hunting is cruel, wildlife can be pets, but that aquifers belong to landowners and wildlife can be pets (bottom right of Fig. 5). These students believed that issues of water availability and habitat destruction were important, and had career interests in nature center education and other areas (bottom right; Fig. 6). A group of students (top of Fig. 5 and 6) included those who did not plan to attend graduate school, had no opinion about government protection of endangered species, and disagreed that government should protect wildlife in sanctuaries from people, that animals have rights like people, that government should regulate hunting, or that wildlife belong to all people, and did not consider endangered species and overhunting issues as important, and had career interests in private consulting. However, another group near the center of the plot, who planned to attend graduate school, agreed that landowners owned the wildlife and water on their property, high fences were OK, that animals could be bred and released for hunting, and were interested in careers in public school education, as government wildlife biologists, or were undecided and that issues of water pollution are very important and over-harvesting of marine fishes is important, but did not think river access or high fences were important issues (center right of Fig. 6).

The left center side of the plot of CCA 3 and 4 (Fig. 5) represents students who disagreed that fishing and hunting is cruel or that landowner costs of endangered species should be reimbursed, and disagreed that streams and aquifers belong to landowners, or

that high fencing is OK, agreed that people manage wildlife, wildlife belong to all people, and hunting is necessary. These students were primarily males and responding in 2000 and had career interests as conservation officers, agreed that issues of endangered species and over-hunting of wildlife are important, and water availability, access to rivers, and high fencing are extremely important (center left of Fig. 6). Another group of mostly male students were undecided about graduate school (center left of Fig. 5), were interested in careers as ranch managers and government fisheries biologists, agreed that issues of access to rivers and high fencing are important and over-harvesting of marine fishes is extremely important (center left of Fig. 6).

Partial Canonical Correspondence Analysis indicated that all explanatory variables combined to explain 24.2% of the patterns of student responses to value statements and only 2.26% of this variation was shared among these variables (Table 6b.) Responses depended significantly on gender (1.21% of the variation) and year (1.21% of variation), but not graduate school plans (1.31% of the variation). Although importance of issues (10.61% of variation) and career interests (7.6% of variation) explained a larger percent of the variation in responses to value statements, their correlations were not significant (Table 6b.).

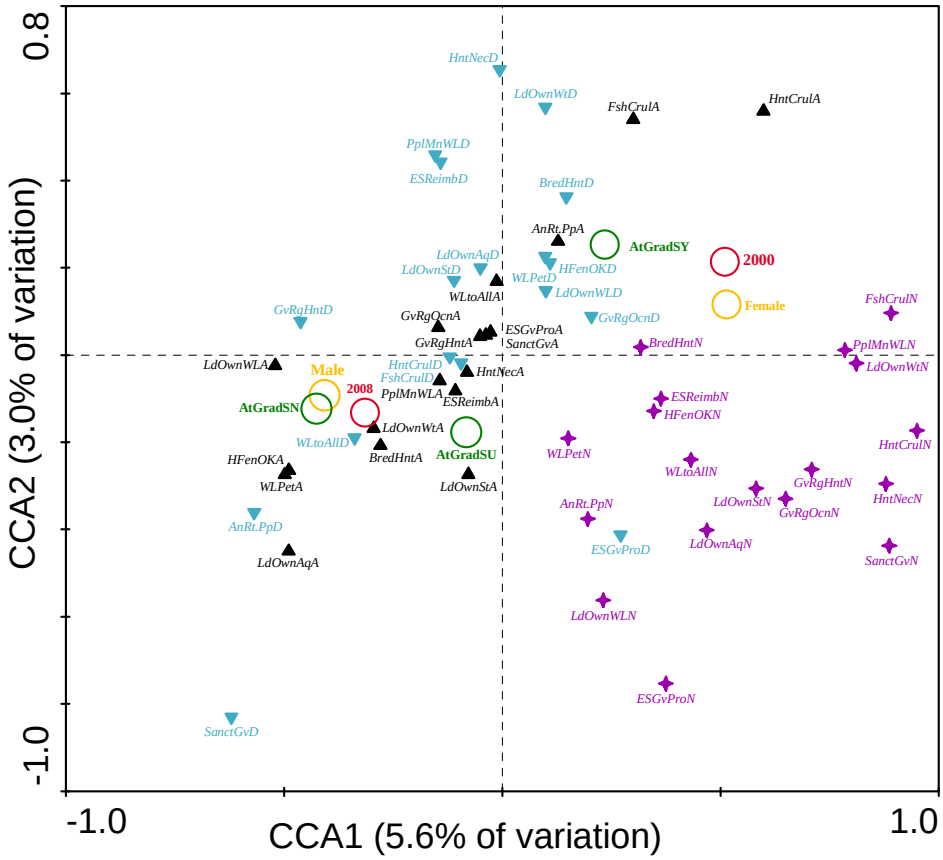

Fig. 3 The results for the first two axes of the canonical correspondence analysis, representing the explained variation in students' agreement to value statements. Codes and symbols are in Tables 3 and 4. Bolded labels for explanatory variables have significant t-values.

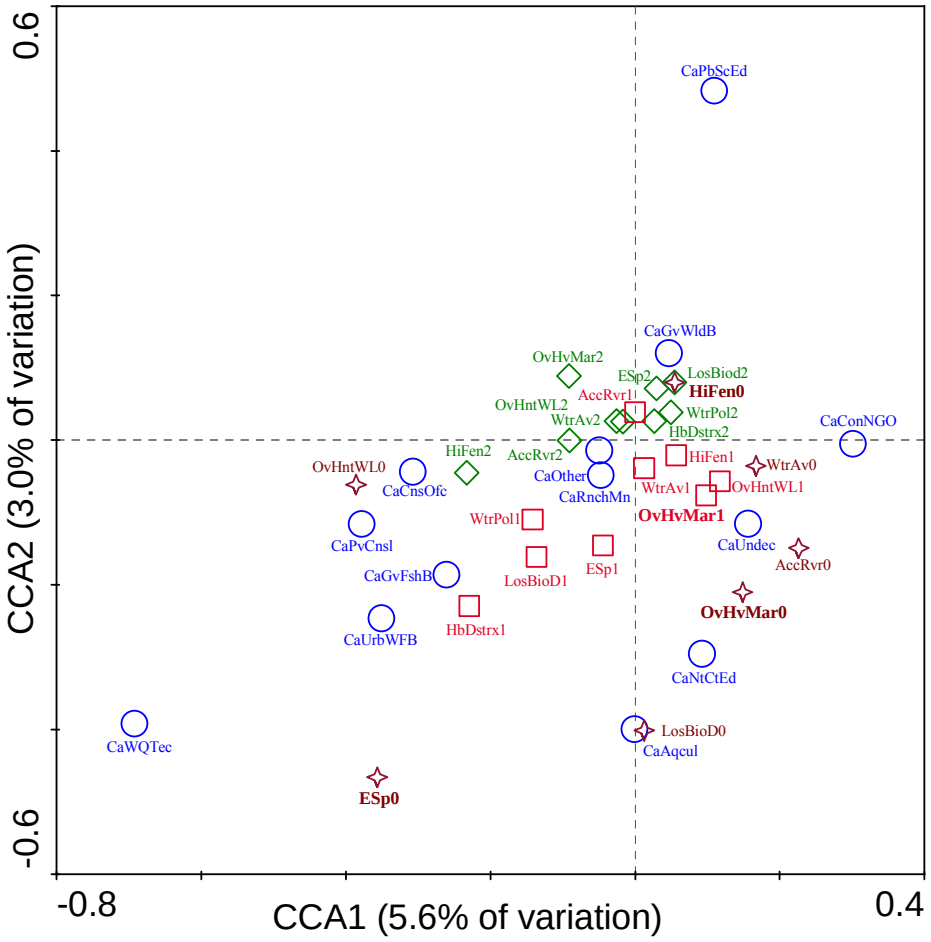

Fig. 4 The results for the first two axes of the canonical correspondence analysis, representing the explained variation in students' agreement to value statements. Codes and symbols are in Tables 2, 4, and 5. Bolded labels for explanatory variables have significant t-values.

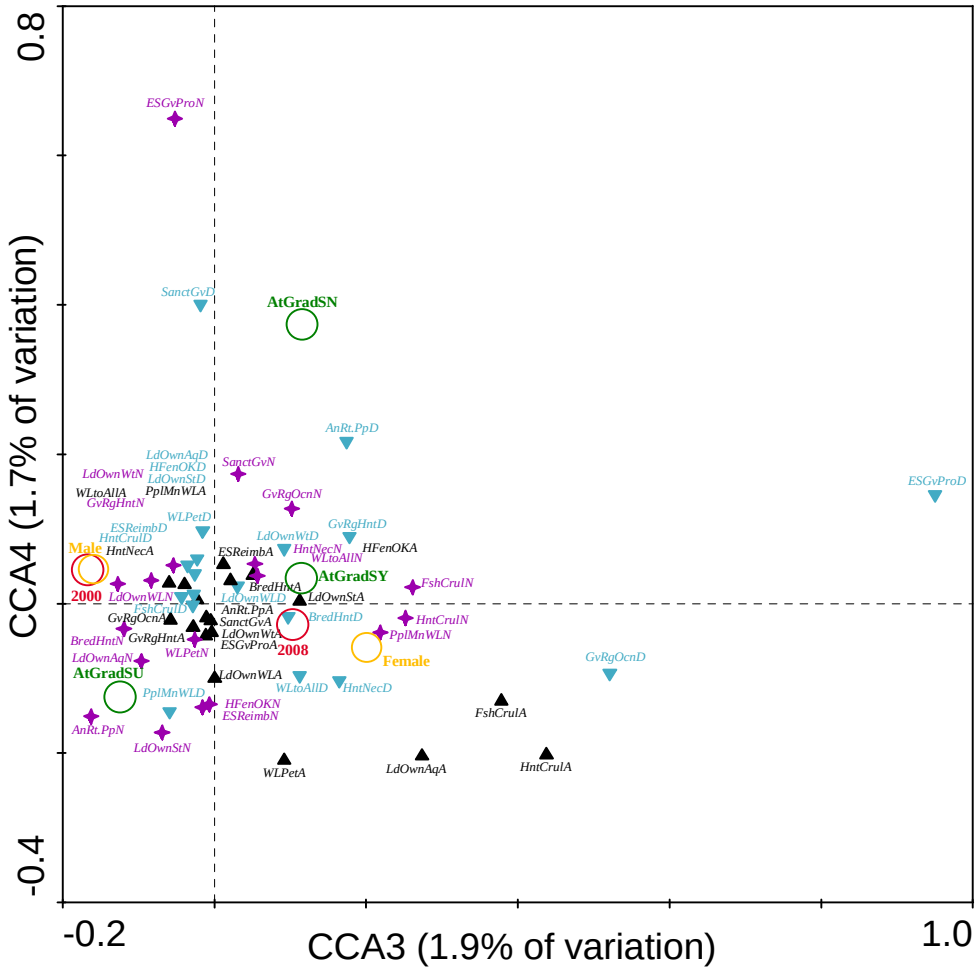

Fig. 5 The results on the third and fourth axes of the canonical correspondence analysis, representing the explained variation in students' agreement to value statements. Codes and symbols are in Tables 3 and 4. Bolded labels for explanatory variables have significant t-values.

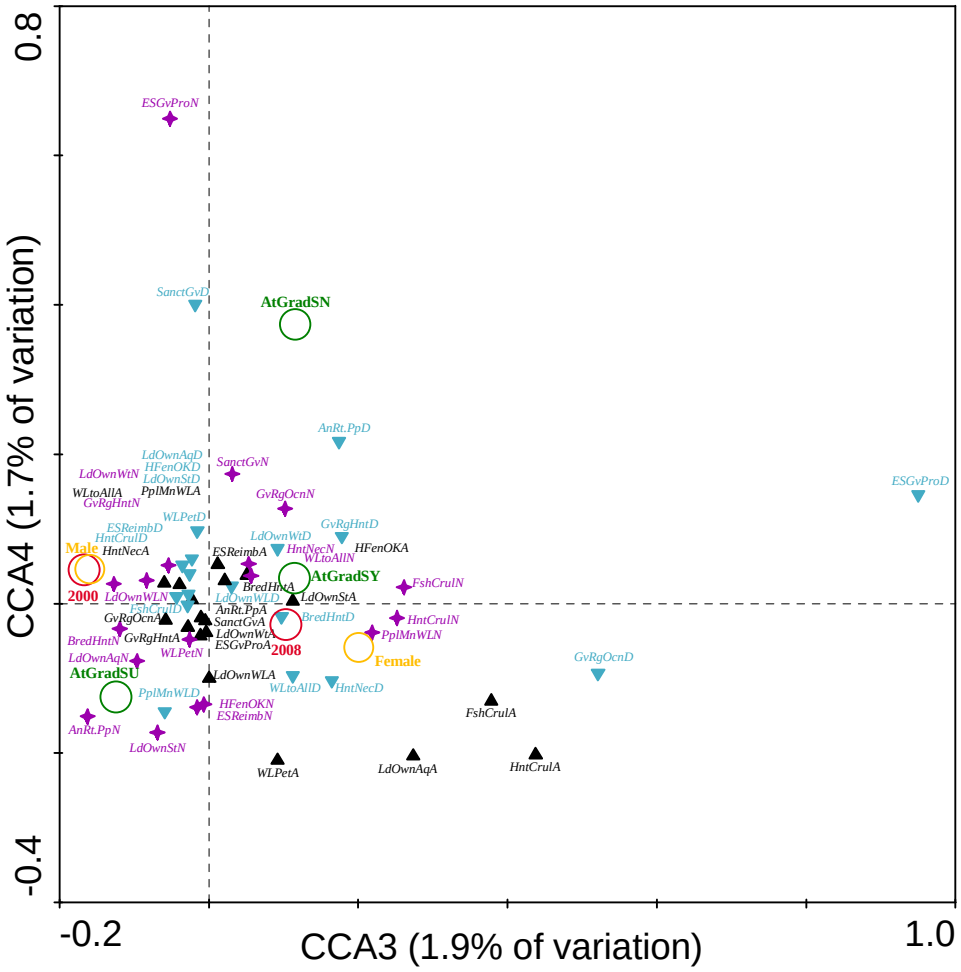

Fig. 6 The results on the third and fourth axes of the canonical correspondence analysis, representing the explained variation in students' agreement to value statements. Codes and symbols are in Tables 2, 4, and 5. Bolded labels for explanatory variables have significant t-values.

4. SUMMARY AND DISCUSSION

4.1 Student choices of curriculum options

Career interests, curriculum options, and graduate school plans were highly correlated. Students who chose careers that require further education (graduate/ professional school) had plans to attend graduate school and students who chose careers that did not require further education were generally undecided about graduate school. Gender was less important than career interests as explanatory variables for curriculum choice. The major pattern in student responses was a separation among three groups of students who chose teaching versus those who chose either aquaculture or fisheries ecology and management, versus those who chose other curriculum options. Differences among these groups was influenced by the smaller number of career interests that were closely associated with the first two curriculum groups. For example, students who chose the teaching curriculum option, primarily had career interests as public school teachers, were somewhat more likely to be female, and intended to enter graduate or professional school; whereas males interested in education were undecided about graduate or professional school. Students who chose aquaculture as a curriculum option tended to be singularly interested in it as a career, although some were interested in becoming government fisheries biologists or conservation officers, but more in the latter group chose the fisheries ecology and management curriculum and were somewhat more likely to be males. Students who chose curricula in wildlife ecology and management were more likely to be male, and interested in careers in ranch management and as government wildlife biologists. There is likely a trade-off between the specific (and

different) curricular needs of students in the aquaculture and teaching options (e.g., specific course content knowledge and skills) that differ from general knowledge and skills included as learning outcomes for the other wildlife curriculum options. Thus, students in the more general wildlife options may have a wider range of career choices. Relationships among these variables did not significantly differ between 2000 and 2008, despite the fact that there were more responses by males in 2000 than in 2008. This information could be beneficial for the department as they plan both the curriculum options and the allocation of human, physical, and monetary resources to accommodate students with such different needs. For example, Students who selected the curriculum option in teaching ranged from 10% in 2000 to 3% in 2008 and this curriculum option has not been offered in the Department of Wildlife and Fisheries Sciences since 1998.

4.2 Student value statements

Students' career interests and the importance that students placed on natural resource issues were related to their value statements about those natural resources. However the significance of these patterns depended on student gender and the year the survey was administered. Although the total number of students participating in the survey increased from 63 in 2000 to 95 in 2008, the percentages of males and females were similar; in 2000, 52% (33) were males and 42% (26) were females; in 2008 56% (53) were males and 44% (42) were females.

Viewpoints of both males and females about landowner rights changed (Fig. 7); students in 2000 believed that wildlife belong to all; in 2008 students believed in

landowner rights including rights to wildlife, water in an aquifer, and that wildlife can be pets. In contrast, differences in viewpoints between males and females were consistent in 2000 and 2008 with regard to use of wildlife (Fig 8). Males agreed that hunting is necessary and disagreed that hunting and fishing are cruel, whereas females held the opposite belief in both years. In a study of students from ten educational institutions in Central Finland, gender was shown to influence student attitudes about the environment; males had negative attitudes about conservation and the environment and females had more positive attitudes about these issues (Tikka et al., 2000). Across several studies males were more frequently involved in hunting and fishing (using wildlife for sport, a utilitarian point of view) whereas females were more concerned about preserving wildlife and the environment (Tikka et al, 2000; Kellert & Berry, 1987; Caro et al, 1994).

Similarly in my study, females tended to agree that hunting and fishing are cruel and animals have rights like people, whereas males tended to disagree with those statements. These views were related to students' importance ratings for issues, but gender differences in importance of issues were stronger in 2000 than in 2008. Although endangered species, habitat destruction, and loss of biodiversity were important issues to both males and females in 2000, females were also interested in environmental issues such as water pollution, whereas males were also interested in landowner rights such as high fencing, access to rivers, water availability, and over hunting of wildlife. Common changes to both males and females can be interpreted as an addition or increase over time in the importance of conservation issues and growth in career interests as water

quality technicians and in urban wildlife and fisheries. Both males and females in 2000 were interested in careers with conservation NGO's, females were additionally interested in public school education and as government wildlife biologists, whereas males were additionally interested in private consulting and as conservation officers. However, in 2008 females continued their career interests in education (nature center education) and males continued their interests as conservation officers and in private consulting, and added ranch management, reflecting gender differences in conservation issues that continued into 2008.

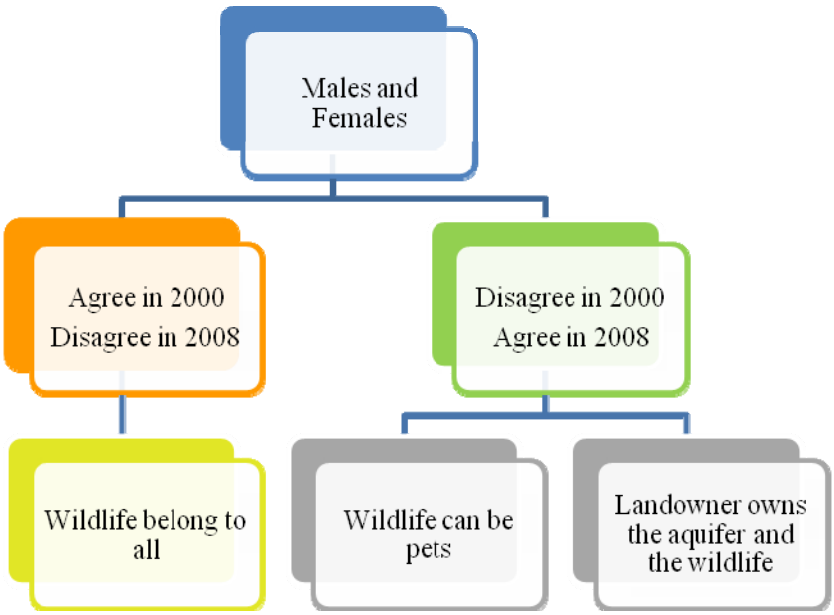

Fig. 7 Students' responses to value statements about landowner rights in 2000 and 2008 (Survey Question 18 in 2000, Appendix B; Question 20 in 2008, Appendix C).

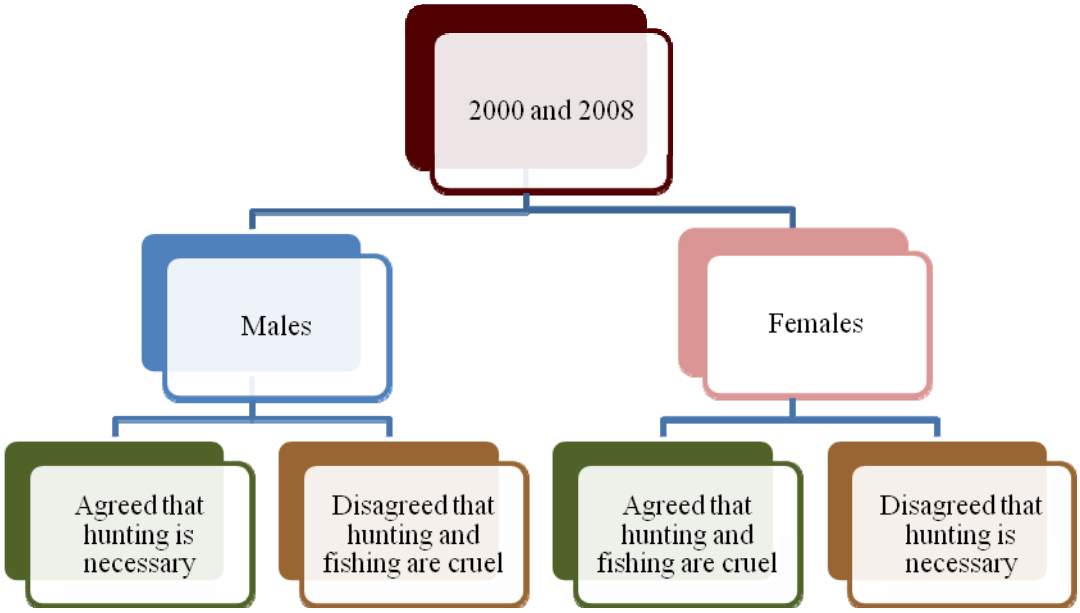

Fig. 8 Gender (males and females) responses to value statements with regard to use of wildlife (Survey Question 18 in 2000, Appendix B; Question 20 in 2008, Appendix C).

4.3 Information for the WFSC department

Results from the analysis have provided some information about the undergraduate students in the Wildlife and Fisheries Department at Texas A&M University. Student responses to career interests and curriculum options have provided information about student interests. This information should be useful in guiding decisions about adapting the curriculum content to the career needs and interests of WFSC students. Moreover, by repeating the same survey questions in a survey of graduating seniors, analysis of responses could provide findings to indicate the influence of the WFSC degree program on student career and curriculum choices, as well as program learning outcomes.

The department can use this information to help advisors to guide students' decisions about curriculum options to meet skill requirements for careers of interest. Analyses summarized above, represent changes in students' curriculum and career interests and students' attitudes and opinions about conservation and environmental issues. These results have provided some information to help monitor the changes in students' attitudes related to the learning outcomes and objectives of the undergraduate degree programs in the Wildlife and Fisheries Sciences department at Texas A&M University.

4.4 Limitations of my study and recommendations

There are a few limitations in my study. First, data was based on a small sample size. The data only included undergraduate students (non-seniors) in 2000 and 2008. There was a large gap between 2000 and 2008, when the surveys' were administered. Second, some responses had to be re-coded in order to analyze the data in my study, due to variations among questions on the surveys for 2000 (Appendix B) and 2008 (Appendix C). Therefore, if a survey is going to be used to determine student learning outcomes and knowledge, the same survey needs to be administered consecutively over time to increase the data set. The format of the survey should not change from year to year so data does not get excluded due to inconsistency. Another recommendation would be to use consistency among questions and answers on the survey. For example, if faculty wanted to observe student responses to curriculum options and career interests, the questions and answer choices should match.

More conclusive information could be provided if the progression of cohorts of students at their entrance into and exit from the department were tracked throughout their time. However this would require tracking the identification of individuals so that additions and deletions to the student population could also be included in the analysis.

Faculty can review results from repeated surveys and make recommendations for improvements and changes that are needed in the curriculum (Cook et al. 2006). Revisions made to the curriculum would benefit future students in the department. I found no substantial information from previous studies, about the relationships among gender and student choices of curriculum options and career interests. I think this would be an interesting area for future studies.

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APPENDIX A

NINE PRINCIPLES OF GOOD PRACTICE FOR ASSESSING STUDENT LEARNING

1) The assessment of student learning begins with educational values.

2) Assessment is most effective when it reflects an understanding of learning as multidimensional, integrated, and revealed in performance over time.

3) Assessment works best when the programs it seeks to improve have clear, explicitly stated purposes.

4) Assessment requires attention to outcomes but also and equally to the experiences that led to those outcomes.

5) Assessment works best when it is ongoing not episodic.

6) Assessment fosters wider improvement when representatives from across the educational community are involved.

7) Assessment makes a difference when it begins with issues of use and illuminates questions that people really care about.

8) Assessment is most likely to lead to improvement when it is part of a larger set of conditions to promote change.

9) Through assessment, educators meet responsibilities to students and to the public.

APPENDIX B

SURVEY FOR INTITIAL ASSESSMENT ADMINISTERED IN 2000

INFORMATION SURVEY
DEPARTMENT OF WILDLIFE AND FISHERIES SCIENCES

Circle your responses or fill in appropriate blanks.

1. ____ Female ____ Male

2. I am a student in which of the following departments:

   a. WFSC c. RLEM
   b. RPTS d. FRSC
   Other _____

3. I am most interested in which of the following curriculum options (choose 1):

   a. Aquaculture
   b. Fisheries Ecology and Management
   c. Conservation Biology
   d. Natural Resource Collections and Museum Science
   e. Teaching
   f. Urban Wildlife and Fisheries Management
   g. Vertebrate Zoology
   h. Wildlife Ecology and Management
   i. Natural Resources Conservation Option
   j. Not applicable (not a student in WFSC)
   k. Undecided

4. I entered my department (all majors) as a:

   a. Freshman
   b. Transfer from another department at TAMU
   c. Transfer from another College or University

5. The population of my hometown is:

   a. less than 5,000
   b. 5,001 - 25,000
   c. 25,001 - 100,000
   d. 100,001 - 500,00
   e. >500,000

6. Did you grow up living on a ranch or farm? _____ yes _____ no

7. While you were in high school how often did you watch a nature program, such as those on the Discovery Channel or those sponsored by National Geographic, on TV?

   a. more than 2 times a week
   b. once a week
   c. once a month
   d. seldom

8. While growing up, which of the following activities did you often participate in (often enough to develop competence in the activities)? [choose as many as appropriate]

a. camping
b. freshwater fishing
c. saltwater fishing
d. bird watching
e. golf
f. hiking
g. swimming
h. hunting - big game
i. hunting - small game
j. hunting - waterfowl
k. photography
l. boating
m. insect collection

9. Did you participate in a 4-H program while growing up? _____ yes _____ no

10. Did you participate in a Boy Scout or Girl Scout program? _____ yes _____ no

11. How important are the following issues to you? [choose 0 = not an issue, 1 = important issue, 2 = extremely important issue] Rate each issue.

Issue	Rating		
a. endangered species	0	1	2
b. landowner rights	0	1	2
c. water availability	0	1	2
d. over harvest of marine fishes	0	1	2
e. habitat destruction	0	1	2
f. water pollution	0	1	2
g. high fences	0	1	2
h. over hunting of wildlife	0	1	2
i. access to rivers	0	1	2
j. loss of biodiversity	0	1	2

12. Which of the following species do you believe is endangered (choose 1)?

a. mountain lion
b. white-tailed deer
c. American alligator
d. channel catfish
e. whooping crane

13. Do you plan to attend graduate school, or other professional school, after finishing your B.S. degree? _____ yes _____ no _____ undecided

14. At this time which of the following careers are you most interested in (choose 1)?

a. fisheries biology
b. conservation officer (game warden)
c. wildlife biology
d. park interpretation
e. ranch management (wildlife)
f. museum education
g. private consulting
h. aquaculture
i. conservationist with a non-governmental organization
j. water quality technician
k. urban wildlife or fisheries biologist
l. nature center education
m. undecided
n. public school teacher
o. other (identify) _____

15. My favorite class in high school was (choose 1):

a. chemistry
b. physics
c. biology
d. agricultural science
e. math
f. literature
g. history
h. physical education
i. other (identify) _____

16. Who or what influenced you the most in choosing Wildlife and Fisheries Sciences as an academic department? (choose 1)

a. high school guidance counselor
b. parent(s)
c. friend
d. TV program(s)
e. agricultural extension agent
f. recruiting by TAMU
g. WFSC professor
h. WFSC student
i. wildlife or fisheries biologist
j. conservation officer (game warden)
k. Texas Parks & Wildlife Dept. programs
l. past interest in outdoor activities
m. recruiting by College of Agriculture & Life Sciences
n. other (identify) _____

17. How interested are you in the following animals? [For each animal category circle the appropriate interest level: 0 = no interest, 1 = a little, 2 = a lot]

Animal	Interest Level		
a. fish	0	1	2
b. song birds	0	1	2
c. beaver	0	1	2
d. snakes	0	1	2
e. deer	0	1	2
f. ducks and geese	0	1	2
g. dogs	0	1	2
h. lizards	0	1	2
i. squirrels	0	1	2
j. butterflies	0	1	2
k. mountain lions	0	1	2
l. turtles	0	1	2
m. bass	0	1	2
n. rabbits	0	1	2
o. house cats	0	1	2
p. frogs	0	1	2
q. turkeys	0	1	2

18. Do you agree or disagree with the following statements? Place an x on the appropriate blank for each statement.

Agree	Disagree	No Opinion		
____	____	____	a.	Hunting is a necessary means of managing wildlife populations.
____	____	____	b.	Hunting is cruel and should be illegal.
____	____	____	c.	Wildlife on private land should belong to the landowner.
____	____	____	d.	The state and/or federal government should regulate hunting, even on private land.
____	____	____	e.	Water in ponds and lakes on private land should belong to the landowner.
____	____	____	f.	Water in aquifers below private land should belong to the landowner, and he/she should be allowed to pump all the water he/she wants.
____	____	____	g.	If a stream flows through a person's land, he/she should be allowed to use all that he/she wants.
____	____	____	h.	Owners of private land should be allowed to erect 10' fences to fence wildlife in or out.
____	____	____	i.	Endangered and/or threatened species should be protected by the federal government.
____	____	____	j.	Landowners should be reimbursed for any costs or economic losses due to complying with the law protecting endangered species.
____	____	____	k.	Animals have rights, just like people.
____	____	____	l.	People have the right to manage wildlife populations.
____	____	____	m.	Wildlife belong to all of the people, even if found on private land.
____	____	____	n.	It is OK to breed and raise wildlife (deer, ducks, quail) to release for hunting.
____	____	____	o.	The fish and shrimp in the ocean belong to everyone and the government has the right to regulate recreational and commercial harvest.
____	____	____	p.	It is a good idea to have some "wilderness or sanctuary areas" for wildlife, protected by the government where no hunting or camping is allowed.
____	____	____	q.	Individuals should be allowed to have wild animals as pets.
____	____	____	r.	Fishing is cruel and should be illegal.

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APPENDIX C

SURVEY FOR INITIAL ASSESSMENT ADMINISTERED IN 2008

Human Dimensions Survey for Introductory Wildlife and Fisheries Conservation

Circle your responses or fill in appropriate blanks.

1. ____ Female ____ Male

2. I am a student in the department of _____

3. I am most interested in the following curriculum options or areas of concentration (choose 1):

   a. Aquaculture
   b. Fisheries Ecology and Management
   c. Conservation Biology
   d. Taxonomy/Natural Resource Collections and Museum Science
   e. Teaching
   f. Urban Wildlife and Fisheries Management
   g. Vertebrate Zoology
   h. Wildlife Ecology and Management
   i. Natural Resources Conservation Option
   j. Natural Resources and Economic Policy
   k. Other_____
   l. Undecided

4. I entered my department as a:

   a. Freshman
   b. Transfer from another department at this College or University
   c. Transfer from another College or University

5. The population of my hometown is:

   a. Less than 5,000
   b. 5,001 - 25,000
   c. 25,001 - 100,000
   d. 100,001 - 500,00
   e. >500,000

6. Did you grow up living on a ranch or farm? _____ yes _____ no

7. While you were in high school how often did you watch a nature program, such as those on the Discovery Channel or those sponsored by National Geographic, on TV?

   a. more than 2 times a week
   b. once a week
   c. once a month
   d. seldom
   e. never

8. While growing up, which of the following activities did you often participate in (often enough to develop competence in the activities)? (Choose as many as appropriate)

   a. camping
   b. freshwater fishing
   c. saltwater fishing
   d. bird watching
   e. golf
   f. hiking/backpacking
   g. swimming
   h. hunting - big game
   i. hunting - small game
   j. hunting - waterfowl
   k. nature photography
   l. boating
   m. insect collection

9. Did you participate in a 4-H program while growing up? _____ yes _____ no

10. Did you participate in a Boy Scout or Girl Scout program? _____ yes _____ no

11. Did you participate in other outdoor youth groups? If so, which?_____

12. How important are the following issues to you? [Rate each issue: 0 = not an issue, 1 = important issue, 2 extremely important issue]

Issue	Rating		
a. endangered species	0	1	2
b. landowner rights	0	1	2
c. water availability	0	1	2
d. over-harvest of marine fishes	0	1	2
e. habitat destruction	0	1	2
f. water pollution	0	1	2
g. high fences	0	1	2
h. over-hunting of wildlife	0	1	2
i. access to rivers	0	1	2
j. loss of biodiversity	0	1	2
k. Invasive species	0	1	2

13. From the list below, which species do you believe are endangered? (Circle as many as appropriate)

a. mountain lion
b. white-tailed deer
c. American alligator
d. channel catfish
e. whooping crane
f. red-cockaded woodpecker
g. wolf
h. redfish
i. painted bunting
j. striped bass
k. snapping turtle
l. red-tailed hawk
m. box turtle
n. ocelot
o. gopher tortoise
p. fox squirrel

14. After finishing your B.S. degree do you plan to attend:

a.) graduate school _____ yes _____ no _____ undecided
b.) health related professional school _____ yes _____ no _____ undecided
c.) professional (law) school _____ yes _____ no _____ undecided

15. At this time which of the following careers are you most interested in (choose 1)?

a. government fisheries biologist
b. conservation officer (game warden)
c. government wildlife biologist
d. park interpretation
e. ranch management (wildlife)
f. museum education
g. private consulting
h. aquaculture
i. conservationist with a non-governmental organization
j. water quality technician
k. urban wildlife or fisheries biologist
l. nature center education
m. public school teacher
n. college teacher
o. research scientist
p. Industry Fisheries Biologist
q. Industry Wildlife Biologist
r. other (identify)_____
s. undecided

16. My favorite class in high school was (choose 1):

a. chemistry
b. physics
c. biology
d. agricultural science
e. math
f. literature
g. history
h. physical education
i. other (identify) _____

17. Who or what influenced you the most in choosing your academic department? (choose 1)

a. high school guidance counselor
b. parent(s)
c. friend
d. TV program(s)/ other media
e. agricultural extension agent
f. University or College professor
g. University or College student
h. wildlife or fisheries biologist
i. conservation officer (game warden)
j. State Natural Resources Dept. programs
k. past interest in outdoor activities
l. recruiting by University or College
m. other (identify) _____

18. How important do you feel the following topic areas are to your field of study? [choose 0 = not important, 1 = important, 2 = extremely important issue]

Topic Areas	Rating		
Biology	0	1	2
Zoology	0	1	2
Math	0	1	2
Statistics	0	1	2
Ecology	0	1	2
Economics	0	1	2
Chemistry	0	1	2
English (writing)	0	1	2
Communication (oral)	0	1	2
Literature	0	1	2
Agricultural Sciences	0	1	2

19. How interested are you in the following animals (animal groups)? [For each animal category circle the appropriate interest level: 0 = no interest, 1 = a little, 2 = a lot]

Animal	Interest Level		
a. fish	0	1	2
b. song birds	0	1	2
c. beaver	0	1	2
d. snakes	0	1	2
e. deer	0	1	2
f. ducks and geese	0	1	2
g. dogs	0	1	2
h. lizards	0	1	2
i. squirrels	0	1	2
j. butterflies	0	1	2
k. mountain lions	0	1	2
l. turtles	0	1	2
m. bass	0	1	2
n. rabbits	0	1	2
o. house cats	0	1	2
p. frogs	0	1	2
q. turkeys	0	1	2
r. dolphins	0	1	2
s. chimpanzee	0	1	2
t. blue marlin	0	1	2
u. wolves	0	1	2
v. whales	0	1	2
w. bats	0	1	2
x. foxes	0	1	2
y. eagles/hawks	0	1	2

20. Do you agree or disagree with the following statements? Place an x on the appropriate box for each statement.

Agree	Disagree	No Opinion		
			a.	Hunting is a necessary means of managing wildlife populations.
			b.	Hunting is cruel and should be illegal.
			c.	Wildlife on private land should belong to the landowner.
			d.	The state and/or federal government should regulate hunting, even on private land.
			e.	Water in ponds and lakes on private land should belong to the landowner.
			f.	Water in aquifers below private land should belong to the landowner, and he/she should be allowed to pump all the water he/she wants.
			g.	If a stream flows through a person's land, he/she should be allowed to use all that he/she wants.
			h.	Owners of private land should be allowed to erect 10' fences to fence wildlife in or out.
			i.	Endangered and/or threatened species should be protected by the federal government.
			j.	Landowners should be reimbursed for any costs or economic losses due to complying with the law protecting endangered species.
			k.	Clearcutting is an important technique for wildlife habitat management.
			l.	People have the right to manage wildlife populations.
			m.	Wildlife belong to all of the people, even if found on private land.
			n.	It is OK to breed and raise wildlife (deer, ducks, quail) to release for hunting.
			o.	The fish and shrimp in the ocean belong to everyone and the government has the right to regulate recreational and commercial harvest.
			p.	It is a good idea to have some wilderness or sanctuary areas for wildlife, protected by the government where no hunting or camping is allowed.
			q.	Individuals should be allowed to have wild animals as pets.
			r.	Fishing is cruel and should be illegal.
			s.	Animals have rights, just like people.
			t.	Prescribed fire is an important technique for wildlife habitat management.

VITA

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